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# The Role of Service-Learning and Mentoring in the Early Career Development of a Research Methodologist

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**Abstract**

Anxiety about statistics may impede new scholars from developing quantitative research skills and from sharing those skills in service-learning, internship, and work settings. Using an interpretive case study design with a convenience sample of one emerging student leader in a collaborative university-community service-learning research project, we explored the question "How did the career path of a quantitatively skilled researcher develop?" Data collected over a 3-and-a-half-year period included 7 semi-structured interviews with the student during her master's and doctoral program and interviews with 3 mentors, 2 peers, and 2 community partners, as well as observations and documents. A constant comparison analysis method identified emerging themes: the role of mentors in building skills, building trust, and modeling risk taking. The results suggest strategies for increasing the number of new researchers who can bring quantitative research skills and career readiness to their respective fields.

**Keywords**

Doctoral Mentoring, Service-Learning, Career Development, Research Efficacy, Statistics Anxiety

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# The Role of Service-Learning and Mentoring in the Early Career Development of a Research Methodologist

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*Anxiety about statistics may impede new scholars from developing quantitative research skills and from sharing those skills in service-learning, internship, and work settings. Using an interpretive case study design with a convenience sample of one emerging student leader in a collaborative university-community service-learning research project, we explored the question "How did the career path of a quantitatively skilled researcher develop?" Data collected over a 3-and-a-half-year period included 7 semi-structured interviews with the student during her master's and doctoral program and interviews with 3 mentors, 2 peers, and 2 community partners, as well as observations and documents. A constant comparison analysis method identified emerging themes: the role of mentors in building skills, building trust, and modeling risk taking. The results suggest strategies for increasing the number of new researchers who can bring quantitative research skills and career readiness to their respective fields. Keywords: Doctoral Mentoring, Service-Learning, Career Development, Research Efficacy, Statistics Anxiety*

Low research self-efficacy and anxiety about succeeding in quantitative research courses may be limiting graduate students' research skills development and mute the calling to serve society as a professional researcher. Onwuegbuzie and Wilson's (2003) review of the literature on statistics anxiety concluded that anxiety towards statistics course performance negatively affected students' interpretation and application of data. One reason for this anxiety may be related to an earlier crystallization of negative math self-efficacy beliefs, especially for young women (Betz & Hackett, 1987, Hackett, 1985; Lapan, Shaughnessy, & Boggs, 1996). Onwuegbuzie and Wilson also identified several effective means for reducing statistics anxiety, these methods include integrating humor, gimmicks, and journals into the class; discussing anxiety experiences with other students; untimed exams; faculty reassurance and support; and cooperative groups and projects focused on a developing a final professional product. These pedagogical formats are designed to increase students' perception of the worth and value of applied statistics in turn, reducing the base level of anxieties students are expected to experience. More contemporary research in the field (Onwuegbuzie, Leech, Murtonen, & Tähtinen, 2010), has explored the effect of teaching statistics within a mixed-methods course (methodology that simultaneously utilizes both quantitative and qualitative research methods) which is reflective of a growing trend in the use of mixed-methods, especially for interdisciplinary work. The necessity for students and researchers to understand statistics is critical for success in their respective fields, therefore research into techniques for reducing statistics anxiety is of significance.

The research conducted by Unrau and Beck (2004) and Timmerman, Feldon, Maher, Strickland, and Gilmore (2013) showed providing students with the opportunity to work with real data (data sets which are raw, legitimate data as compared to datasets designed to show specific preplanned statistical effects) contributed to the development of research skills.

Zerden, Powers, and Wretman (2014) did just that by integrating a hands-on semester long learning exercises for social work master's level students to highlight components of research design. Students in the course designed, participated, analyzed, and reflected upon the experience of being both the researcher and the participant. Students who engaged in the hands-on learning experiences developed stronger research skills than those who were not in the hand-on learning experience.

We also see the integration of hands-on learning for research methods is being used in multiple institutions. For example, a national survey of social work research methods instructors found that 61% of social work instructors were explicitly using exercises to reduce statistics anxiety (Maschi, Wells, Yoder, Slater, McMillan, & Ristow, 2014). These results are meaningful as historically social work students have not been expected to have a strong statistical/mathematical background. If the techniques used in the aforementioned studies are effective for social work students it would be logical to assume the same techniques would also be effective for students in other social sciences (e.g., psychology and education).

Hands-on projects in qualitative, quantitative, and mixed-methods research classes may help ameliorate some of the students' negative self-efficacy beliefs about math, reduce anxieties about graduate methods classes, increase perceptions of the value and worth of quantitative and qualitative research, and open up career possibilities, all of which are desirable learning outcomes. A more structured approach to hands-on learning is the use of service-learning, the integration of formal community-service directly into academic coursework and learning objectives. Service-learning experiences in the community spark reflection in curricular or co-curricular classes or programs and have been found to promote undergraduate student development (Finley & McNair, 2013) in multiple disciplines ranging from basic writing composition to civic engagement/responsibility (see Butin, 2010; Conway, Amel, & Gerwien, 2009; Zlotkowski, 2011). Thompson's (2009) study of a graduate class on leadership and e-based statistics in the field of education found that the integration of community projects improved students' attitudes towards statistics and helped develop leadership skills. Although service-learning has been further developed as a pedagogical format in the field of community-based research especially due to data-driven, or data-based decision making (Strand, Cutforth, Stoecker, Marullo, & Donohue, 2003), minimal research exists regarding the potential benefits of service-learning into research methodology courses specifically.

While course design is a critical factor for student performance the development and growth of a young researcher is also greatly affected by the advisor-advisee and/or mentor-mentee relationship. Archived studies have shown support and challenge from doctoral students' mentors can be critical in students' scholarly development (Baker & Pifer, 2011; Gadbois & Graham, 2012; Paglis, Green, & Bauer, 2006). According to Lapan (2004), mentors are important in career development as they provide emotional and instrumental support, encouragement of goal-setting and self-regulated learning. Jaeger, Sandmann, and Kim (2011) have offered guidance based on analysis of mentoring of four graduate students doing community-engaged research, which included the co-learning aspect, showing risk-taking on mentors' part. Overall, Deane, and Peterson (2011) found that doctoral students' research self-efficacy was more advanced by support of autonomy than by personal support by mentors. Lambie, Hayes, Griffith, Limberg, and Mullen (2014) and Price-Sharps et al. (2014) found doctoral students who had experience with research, such as publishing, were more likely to have higher research self-efficacy when compared to those who did not have publishing experience. Cuthbert, Sinclair, and Barnacle's (2013) review concluded mentor productivity may be the strongest predictor of research publication by doctoral students. Unfortunately researchers such as Cutright and Anderson (2013) found opportunities for collaborative a mentorship in research skills to be rare, and Lindén, Ohlin, and Brodin (2013) found modeling by doctoral mentors to be lacking. This is concerning as the development of research based

skills is in part influenced by the mentors' research environment and techniques. If graduate students are not being mentored to the necessary extent then we can assume that the development of research based skills are in turn being dampened by a lack of mentorship. As made evident, the influence of the mentor/advisor on a student has been thoroughly investigated however the effect has not been formally applied to the development of quantitative researchers.

## Case Study Sample and Setting

The current case study is of a single individual's development as a new researcher and is based on a convenience sample that emerged as the primary author, Cheryl, met the second author (Heather, a master's student the time), as part of a university-community research collaboration. Heather emerged as a class leader when Cheryl and another research collaborator were given a chance to present a first-year psychology master's level quasi-experimental design course with the challenge of analyzing a large, real-world, data set. When the class service-learning project was over, Dr. Manning (pseudonym), the instructor of the class, invited Heather to attend an international service-learning conference and help present the findings. During the conference she was voluntarily reflecting with Cheryl on her perceptions of her development as a new researcher; having engaged Cheryl in that initial reflection, Cheryl discerned that Heather's rapid development and self-reflection was a unique opportunity for a case study (Merriam, 1998; Yin, 1994). Patton's (1990) elaboration of types of cases might suggest this may be an "intense" case, as Cheryl perceived the available data would be rich and that Heather, the single subject, was eager to collaborate in the data collection process. It was determined that Cheryl would interview Heather as she applied to doctoral programs and went through graduate study. Cheryl also interviewed several people who were critically involved in Heather's growing skills and work as a researcher.

## Methods

Using an interpretive case study design we researched the question "How did the career path of a quantitatively skilled researcher develop*?"* Data came from semi-structured interviews, observations, and documents over a 3½ year period. All the interviews with Heather and her mentors and peers were guided by the same phenomenological questions: "In regard to your/Heather's ongoing development as a new researcher, what stands out for you? What surprises you? What puzzles you? What's next?" The opening questions were followed by prompts that continued to evolve as a result of constant comparison data analysis (Glaser & Strauss, 2009). The data sources included seven interviews with Heather over the course of 3 ½ years. The interviews occurred at the international conference where she helped present her masters class's service-learning research findings, during her last year in the master's program, upon completion of the master's program, three times during her first year of doctoral studies, and once at the end of the second year. In addition, data included interviews with six other people, including Heather's quasi-experimental design faculty instructor/mentor during the master's program, Dr. Manning; her research methodology doctoral advisor, Dr. Hillman (pseudonym); two community research partners; and two doctoral student peers who Heather tutored in quantitative research methods. Participant observations were all completed at the international research conference. Documents included research reports, a PowerPoint presentation by Heather, and evaluations of Heather's course work in her doctoral program.

Data were analyzed using a constant comparison method (Glaser & Strauss, 2009). Data were coded inductively after each cycle of data collection then compared with previous themes and other segments of data. The emerging themes helped guide later interview prompts. The

primary author completed data analysis by engaging all interviewees in member checking of transcripts and excerpts of the final article to help ensure corroboration of themes and proper interpretation of data. While the study represents a unique relationship of the two authors, Cheryl, the lead author, has never been in an evaluative capacity over the student, Heather, who is the focus of the case study. Heather agreed to be a co-author and wished not be disguised with a pseudonym, finding anonymity impossible and impeding of the value of the collaborative research (Nespor, 2000). As co-author, Heather had the opportunity to validate the data analysis and review and amend the paper.

## Results

The findings are presented in relationship to one central theme: the importance of mentoring, which includes the pivotal value of a mentor's risk-taking to include service-learning in a quantitative research methods class, offering support and challenge as well as trust and collaboration.

### Mentoring in the Development of a Career Path in Quantitative Research

Along her career path as a new researcher, Heather developed relationships with at least three different mentors who helped her build skills, explore research as a career, and make choices at critical junctures through building trusting relationships and modeling taking risks. She perceived the three mentors as encouraging her budding interest in being a quantitatively skilled researcher and giving her opportunities to work with real world data and community partners, all of which she observed expanded her research skills to include qualitative methods, mixed-methods, and program evaluation as well.

**Master's level**. During her master's program in psychology, a service-learning project was introduced into her quasi-experimental design class, fostering an ongoing mentoring relationship with the course professor. The professor, Dr. Manning, was not her assigned faculty advisor, but both Heather and Dr. Manning recognized the nature of the relationship as mentoring. She went beyond the course assignments to explore new research questions and gain new skills outside of the course curriculum, asking Dr. Manning to help find statistical models to explain what she thought the data was revealing. In his mentoring role, Dr. Manning arranged for Heather to be the leading presenter of the class research project at an international conference. Both Cheryl and Dr. Manning observed the many affirming conversations Heather had with conference participants and invitations she received to apply to doctoral programs. The mentor's invitation to Heather to share her findings with service-learning researchers from around the world may have accelerated her cognitive growth and sense of ownership over her knowledge and self-efficacy as a researcher. Dr. Manning, as mentor, reported witnessing her developing skills:

> She is developing her professionalism, her skill as a researcher in the public...I don't think that [discovery of the voice of authority] would have happened if she didn't stand up in front and present. It gave her perspective on how she valued the project, [how she] gave voice to her learning.

***Mentors modeled risk-taking.*** Heather perceived Dr. Manning's choice to convert his traditionally delivered statistics class into a service-learning class as having life changing consequences regarding her self-image as a learner and a future professional. Over the course of the term she experienced a balance of challenge and support in the classroom from Dr.

Manning and from the community partners. She felt challenged to take responsibility for the concepts she was studying and collaborated with peers in doing so.

> It was different, from the beginning… All of my undergraduate classes had worked with…"canned" data designed to show specific results. (This time) we had no idea what to expect. It was a shock for all the students. We didn't understand the constructs, questions, outcomes…it required learning not only about analyzing the big data set, but learning about service-learning in the process, because you have to understand what you are analyzing in order to analyze it… It was scary.

The students had told one of the community partners "We can't believe you trusted us with that data!" Heather recalled the support she felt as she started the process by trying to find the "right" answer.

> We would do all this analysis and ask [Dr. Manning] ["Is this right?"] and he said, "[I don't know], let's see." And that was very frustrating because you expect your professor to look at your work and tell you [if it's right or wrong], and he wasn't doing that…Towards the end [of the class] we started to understand the data and the constructs …I found myself, actually asking questions about the research question that were not prompted by Dr. Manning. [He] would get so excited. That was the first time I had ever seen a faculty member get excited over students' discoveries. Seeing that he really cared and was invested in our work made me feel an even greater sense of responsibility.

***Mentors offered challenge and support in learning through work experiences.*** Upon the end of the quasi-experimental design class Dr. Manning invited Heather to be a graduate teaching assistant responsible for several undergraduate research methods lab classes (e.g. basic research design, statistics, SPSS, and data interpretation) during her second year of the master's program. Heather reported that she received much appreciation from her students for her ability to help them overcome and manage their statistics anxiety. Heather's developing sense of efficacy not only as a researcher but as a teacher was due in part to the confidence building interactions Heather had with Dr. Manning. He reported feeling a "partnership" with Heather that continued beyond the class and remained a valuable mentor by Heather throughout the 3½ years of this study.

Dr. Manning also modeled engagement and risk taking. Heather reported witnessing Dr. Manning's discovery of the potential for students' learning of community partnerships and community based learning. She was impressed he took the risk of teaching a statistics class without the use of "canned" data. Heather then chose to go beyond the course assignment and pursued a hypothesis that required a complex statistical analysis of the data.

> I told him "There has to be something." I said it four times, so he said "Ok, let's look at it." I needed his skill set to know how to approach the question…It turned out to be something really valuable, it was more satisfying than getting an A in the class, and more exciting than being offered the graduate teaching position.

Dr. Manning, in reflecting on his students' anxiety about doing statistical analysis observed that "I have lots of females in my class and I think some of them believe it's not ok

to like math…and I tell them, it's not math, it's stats." Heather followed his pedagogical example when she was teaching in the stats lab:

> I do what Dr. Manning does with me. I sit down with them and give them keyboard and ask "what do you want to learn?" I see the same enthusiasm he supported in me transferred to my students. Now I find my students are helping others in the class and they say "oh, oh, oh, I understand that, let me help you!"

She also observed Dr. Manning teaching with metaphors which made the statistical information easier to digest and more relatable. Heather then found herself utilizing similar metaphor based explanations and instructional techniques when she taught the methods lab classes. The skills she developed through his mentorship were more than just understanding statistics but being able to convey the meaning and value of those statistics to others, and that was what Heather was doing while teaching the methods lab.

**Doctoral level.** Heather, with the support of two mentors, decided to join a doctoral program in educational research methodology where she and her new doctoral mentor, Dr. Hillman, who also served as assigned faculty advisor, both reported developing an early and strong relationship. Heather's success in her first year of doctoral study was reported by Dr. Hillman and two of Heather's doctoral peers. Dr. Hillman facilitated Heather's career development as a researcher by suggesting to other faculty that Heather be included in research and program evaluation projects. Dr. Hillman witnessed Heather "coming into herself" more through the first year. Fellow students saw Heather as more skilled that they, but static, while the mentor saw additional skills that Heather needed to develop. Dr. Hillman, who had only completed mentoring of two graduates at that point, reported "Heather knows she can come to me and learn something …even if I don't know it either. We have to do it together." Dr. Hillman's pride in this collaborative approach was reflected in an editorial she shared that her two graduates had written for a professional organization's newsletter about the relational nature of her work as their mentor.

***Mentors offered trusting relationship.*** Mentoring became particularly important at critical junctures during Heather's doctoral program, specifically while working through the unexpected challenge of "otherness" which became a very salient and influential experience. For instance, Heather recalled her doctoral class on women in higher education was structured around learning from student peers who were developing skills in leading and facilitating difficult dialogues (e.g., social inequity, race, religion). Dr. Hillman's mentoring offered a safe, nonthreatening, supportive environment that allowed Heather to analyze and reflect upon some of the implications of "otherness." The loosely guided reflection process helped Heather work through some of the challenging course components while also extending the application to one's individual identity as a researcher and academic.

In addition to experiencing a sensation of "otherness" Heather was exposed to what she experienced as polarized perspectives and attitudes towards various research methodologies. Her peers felt the same. This polarization presented itself in the first semester of the doctoral program as Heather perceived her doctoral peers being divided by dualistic perceptions of their own and each other's alliances with either qualitative or quantitative methods. Heather's peer reported:

> We thought quant people speak with reference to numbers that don't take lots of emotions. I thought, "Oh my gosh! What's with this numbers person looking at the quant side of things?" I wrote her off and we never started a friendship …But when I saw the [quantitative methods] class hanging on to her every word

> and for her to say "I can sit with you guys and talk with you (about the assignment)"…of course we jumped at the chance.

Heather was able to discuss this challenge with Dr. Hillman, trusting that "she was there for me."

***Mentoring through collaborative research.*** Finally, Heather came to see Cheryl, who collected the data, as playing a mentoring role as well. Heather believed Cheryl's careful listening and encouragement of critical self-reflection over the 3 1/2 years of data collection as well as their collaborative relationship that developed during an additional year while editing this article, had both challenged and supported her through the final stages of her master's program, at critical junctures in the doctoral program, and in aspects of her personal life that were affected by the doctoral journey. Qualitative research skills building was an unexpected consequence of this newly identified mentoring relationship as well, specifically, collaboratively analyzing data, crafting an article, and exploring possible journals for dissemination. Finally their collaboration over research drew them into conversation about the focus of Heather's dissertation research, which is, unexpectantly to her, qualitative in nature.

## Discussion

The case presented here highlights some potential benefits of collaborative service-learning research projects in the professional development of new researchers. The data have application to all practitioners and professors within the social sciences, not just those specializing in research methodology. Students who undertake graduate studies within a collaborative university-community partnerships are themselves likely to model those same mentorship and tutelage values and while developing healthy methods for integrating risk-taking behaviors the classroom when they are teaching.

Onwuegbuzie and Wilson (2003) suggested structuring instructional materials and classroom activities around real-world data might ameliorate students' anxiety towards quantitative research courses. Here, we have built upon their work by providing one rich example of how a community partner relationship impacted the growth and development of statistical competencies within a quantitatively skilled graduate student.

In our study, Heather reported having felt anxiety about her math ability since a negative learning experience in freshman year of high school; she then reported her fear of statistics was diminished by engagement with the complex data from a problem-solving orientation in the statistics class under the mentorship of a professor who was willing to bring risk-taking and innovative approaches into the classroom. Heather's engagement with her peers in a cooperative group trying to understand real-world data and problem solve for a community partner under the tutelage of a supportive faculty member resulted in a reversal of statistics anxiety for Heather. This outcome is promising and suggests more research should be done to identify and better understanding the benefits of integrating service-learning into courses designed for graduate methods courses.

Our data also lead us to conclude that rich conversations and interaction with mentors can model effective risk-taking behavior while introducing valuable professional skills needed for navigating real-world data problems (e.g., understanding the community partner's needs and expectations and learning how to communicate across disciplinary boundaries). Not only did this result in increased content area expertise, it increased self-efficacy and career development as a new researcher.

As a results of Heather's mastery of the course material, her master's level professor recommended her for a graduate teaching assistantship. Through teaching the same material Heather learned the year before she developed a more intimate and comprehensive

understanding of statistics and quantitative research methods from both an applied and theoretical perspective. This confirms Feldon et al.'s (2011) study where they documented graduate students' teaching experiences improved their methodological research skills, suggesting that research assistantships are not the only effective way for a student to develop professionally as a researcher.

Lastly, the current study introduces a relatively rare data collection method for the service-learning pedagogy literature, which is the unique longitudinal nature of this study. The data suggests that the effects of service-learning pedagogy can be maintained over a long period time. Heather reports that her anxiety towards quantitative research or statistics is completely gone. One may even be able to argue that as a result of conquering her statistics anxiety she was then able to explore other methodological approaches with a more positive and optimistic outlook.

The complexity of interdisciplinary real-world data cannot be easily understood through a single disciplinary lens; as such, traditional pedagogical methods rooted in a single disciplinary lenses are antiquated approaches. Interdisciplinary and real-world skills are only developed through the use of innovative pedagogical approaches such as those described within our current study. Reducing anxiety and increasing engagement through an authentic learning experience with meaningful, real-world data might invite more students to consider a career in research on behalf of communities' needs.

The primary limitations to this study's findings are that they are not generalizable as a single-subject study. An "intense" case capturing one person's development may not find easy application. And the sustained dialogue between the two authors over 3 years has likely also contributed to Heather's development, with Cheryl, the primary author, also serving as what Heather came to perceive as a mentor.

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